New Andean Species of *Solanum* Section *Geminata* (Solanaceae)

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ABSTRACT. Three new Andean species of *Solanum* sect. *Geminata* are described: *S. youngii* from Peru and Ecuador, *S. quebradense* from Venezuela, and *S. habrocaulon* from Peru. Relationships within section *Geminata* are discussed, and the species are illustrated.

Solanum is one of the largest genera of flowering plants, with approximately 2000 valid species. Section *Geminata* (G. Don) Walpers (s.l.) is one of the largest subdivisions of the nonspiny solanums, with some 145 species. Members of the section are distinguished from other nonspiny solanums by their shrubby habit, small white flowers in leaf-opposed inflorescences, and hard green fruits at maturity. Section *Geminata* itself is composed of several smaller monophyletic groupings and is probably related to the *Solanum nitidum* species group and section *Holophylla* (G. Don) Walpers (s. str.). A key distinguishing these groups can be found in Knapp (1989).

Most of the members of section *Geminata* grow in the understory of primary forest and are rare plants of limited distribution. All but one of the species of section *Geminata* are found in the Neotropics, with the highest concentration in the Andes and their foothills. These foothill areas are particularly rich in taxa of families that are primarily understory shrubs (Gentry, 1982), and species diversity of *Solanum* sect. *Geminata* is extremely high in the Andes (Knapp, 1986).

Solanum youngii S. Knapp, sp. nov. TYPE: Ecuador. Zamora-Chinchipe: Parque Nacional Podocarpus, Loja–Zamora road just E of pass, ca. 2800 m, 3°58′S, 79°07′W, 15 Mar. 1989, *Madsen 85888* (holotype, QCA; isotype, AAU). Figure 1A, B.

Frutex; caules dense pubescentes trichomatibus dendriticis; sympodia difoliata, geminata; folia elliptica vel ovata valde bullata subtus dense dendritico-pubescentia; corolla alba; bacca globosa in pedicello erecto portata; semina complanata reniformia.

Shrubs, 1.5–2 m tall; young stems and leaves densely pubescent with matted dendritic trichomes to 1.5 mm long, the trichomes drying a rich golden brown; stems thick, erect; bark of mature stems dark gray. *Sympodial units* difoliate, geminate, occasionally appearing unifoliate through loss of the minor leaf. *Leaves* elliptic to ovate, widest at or just below the middle, thick and fleshy, strongly bullate and corrugated when dry, with 5–6 pairs of primary veins, sparsely to moderately pubescent with dendritic trichomes adaxially, densely pubescent with dendritic trichomes 1–1.5 mm long abaxially, the trichomes denser along the veins, major leaves 7–17 × 4–9.5 cm, the apex acute, the base decurrent onto the petiole; petiole 1.2–2 cm long; minor leaves differing from the majors only in size, 4–8 × 2–4 cm; petiole ca. 1 cm long. *Inflorescences* opposite the leaves, simple, 0.5–7 cm long, 5–40-flowered, but bearing only a few flowers at a time, densely pubescent with dendritic trichomes like those of the stems and leaves. *Pedicel scars* closely spaced, obscured by the dense pubescence of the inflorescence axis. *Buds* globose, later elliptic, strongly exserted from the calyx tube. *Pedicels at anthesis* erect to somewhat deflexed, thick and fleshy, 0.8–1 cm long, pubescent with trichomes like the rest of the inflorescence. *Flowers* with the calyx tube broadly conical, 1–1.5 mm long, the lobes triangular and irregularly splitting, 1–4 mm long, with a tuft of dendritic trichomes at the tips, otherwise sparsely pubescent; *corolla* white, waxy, 1.7–2 cm diam., lobed ca. ⅔ of the way to the base, the lobes planar at anthesis, tips of the lobes with a tuft of dendritic trichomes ca. 0.5 mm long, the margins papillose; *anthers* 5–6 × 1–2 mm, poricidal at the tips, the pores lengthening to slits with age; free portion of the filaments ca. 0.5 mm long, the filament tube ca. 0.5 mm; ovary glabrous; style 7–9 mm long, glabrous; stigma bilobed, the surface minutely papillose. *Fruit* a globose, green berry, 1–1.2 cm diam.; *fruiting pedicels* erect and woody, ca. 2 cm long, ca. 1.5 mm diam. at the base, ca. 2.5 mm diam. at the apex, 1–2 stone cells occasionally present in the pericarp. *Seeds* dark brown, flattened reniform, 2–3 × 1.5–2 mm, the margins incrassate and paler, the surfaces minutely pitted.

Figure 1. —A. Holotype of *Solanum youngii* S. Knapp (*Madsen 85888*, QCA). —B. Isotype of *Solanum youngii* (*Madsen et al. 85888*, AAU).

Distribution. In wet montane and cloud forest, often in forest patches above timberline, in southern Ecuador and northern Peru, from 2800 to 3500 m. Figure 2.

The strongly bullate leaves and the dense dendritic pubescence make this species very distinctive. The trichomes are slender and very highly branched, and the branches themselves are very short. *Solanum youngii* is morphologically most similar to *S. nutans* Ruiz & Pavón, also of the Andean cloud forests, but differs from it in its more loosely branched pubescence, bullate leaves and difoliate geminate sympodial units. It shares with *S. nutans* dark brown, flattened reniform seeds, somewhat pointed fruits, and a high-elevation habit. The stone cells observed in the single fruiting specimen (*Young 2157*) may not be typical for the species: in other species of section *Geminata* such hardened growths are produced in response to insect attack.

This species is named for Ken Young, who has done much for the preservation and study of the montane forests of the central Andes.

Paratypes. ECUADOR. **Loja:** Parque Nacional Podocarpus, S of Loja, Centro de Información E of Nudo de Cajanuma, 2850–2950 m, 4°5'S, 79°10'W, 21–22 Feb. 1985, *Øllgaard et al. 57903* (AAU). **Zamora-Chinchipe:** Loja–Zamora road, near the pass, 2800–2900 m, 15 Mar. 1989, *Romoleroux 814* (AAU). PERU. **San Martín:** Río Abiseo National Park, Chochos, ca. 3425 m, 7°S, 77°W, 25 Nov. 1985, *Young 2157* (F, NY, USM); trail between Mirador and Puerto del Monte, 3300–3450 m, 7°S, 77°W, 27 June 1986, *Young 3833* (NY, USM).

Solanum quebradense S. Knapp, sp. nov. TYPE: Venezuela. Mérida: Mucurubá, quebrada near town, ca. 2600 m, 25 June 1930, *Gehriger 244* (holotype, NY; isotypes, F, MO). Figures 3, 4A.

Frutex vel arbor parva; caules dense pubescentes trichomatibus simplicibus uniseriatis; sympodia unifoliata; folia elliptica vel anguste elliptica supra glabra subtus plusminusve dense pubescentia trichomatibus simplicibus, praesertim in venis densa; inflorescentiae foliis oppositae simplices dense pubescentes; corolla alba; bacca globosa, in pedicello erecto portata; semina ovoideo-reniformia.

Shrubs or treelets, 1–2 m tall; young stems and leaves densely pubescent with simple, uniseriate trichomes 0.5–1 mm long, the stems erect; bark of older stems grayish brown. *Sympodial units* unifoliate. *Leaves* elliptic to narrowly elliptic, widest

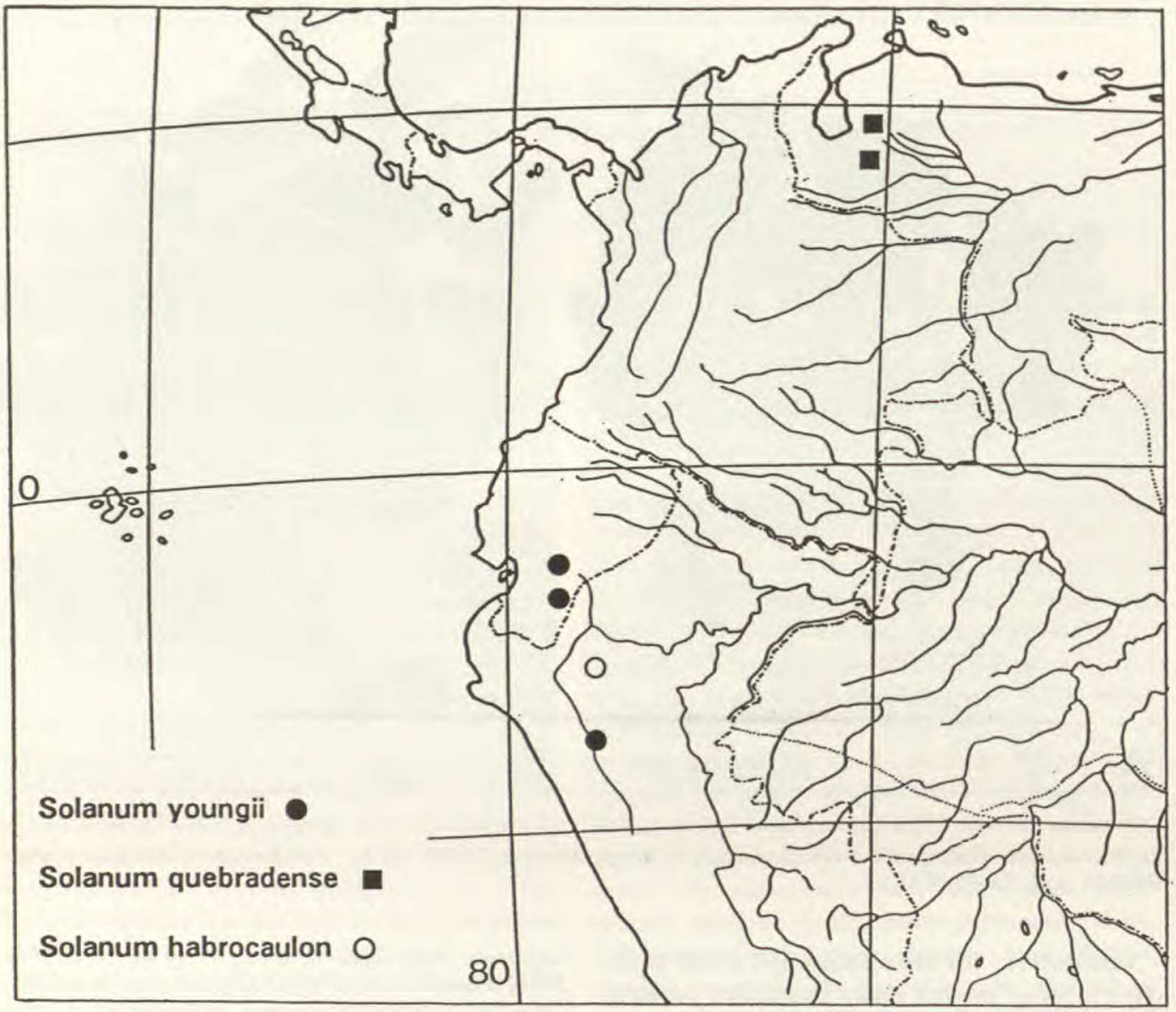

Figure 2. Distribution of *Solanum youngii, Solanum quebradense,* and *Solanum habrocaulon.*

at the middle, with 6–9 pairs of primary veins, thick and somewhat coriaceous, glabrous adaxially, densely to moderately pubescent abaxially with simple uniseriate trichomes 1–1.5 mm long, these denser along the veins, lamina 4–15 × 1.5–5 cm, the apex acute to acuminate, the base acute, somewhat decurrent onto the petiole; petiole 1–1.5 cm long. *Inflorescences* opposite the leaves, simple, 3–5 mm long, 5–8-flowered, densely pubescent with simple uniseriate trichomes like those of the stems and leaves. *Pedicel scars* closely spaced, overlapping. *Buds globose,* later elliptic, strongly exserted from the calyx tube just before anthesis. Pedicels at anthesis reflexed to somewhat erect(?). *Flowers* with the *calyx* tube broadly conical, 1–1.5 mm long, the lobes elongate deltate, with the tips rounded, 1–2 mm long, sparsely pubescent with simple uniseriate trichomes; *corolla* white, 1–1.2 cm diam., lobed ca. ¾ of the way to the base, the lobes planar (?) at anthesis, the tips and margins of the lobes densely pubescent with simple trichomes; *anthers* 4.5–5 × 1–1.5 mm, poricidal at the tips, the pores lengthening to slits with age; free portion of the filaments ca. 0.5 mm long, filament tube ca. 0.5 mm long; ovary glabrous; style 6–7 mm long; stigma capitate and minutely bilobed, the surface papillose. *Fruit* a globose, green berry, 1–1.2 cm diam.; *fruiting pedicels* erect, woody, 1.7–2.7 cm long, ca. 1.5 mm diam. at the base, ca. 2 mm diam. at the apex. *Seeds* dark brown, ovoid-reniform, 3–4 × 2–2.5 mm, the surface very smooth, the embryo clearly visible through the testa.

Distribution. Cloud forests in the Venezuelan Andes in the states of Mérida and Trujillo, from 2200 to 3200 m. Figure 2.

Solanum quebradense is superficially very similar and probably closely related to *S. callianthum* C.V. Morton of high-elevation Colombia. It can be dis-

Figure 3. *Solanum quebradense* S. Knapp (*Knapp & Mallet 6778*, Edo. Trujillo, Venezuela). Photo actual size.

tinguished from that species by its simple rather than dendritic pubescence, narrower leaves, glabrous ovaries, and smaller, less fleshy flowers. These two species share uniseriate, rather than arachnoid, pubescence. Fruits of *Knapp & Mallet 6778* were very pale green to nearly white in color. Only the type collection bears flowers.

This species is named for the habitat in which the type was collected, a small stream or quebrada.

Paratypes. VENEZUELA. **Mérida:** Monte Zerpa, Páramo de los Conejos, 3100–3200 m, 16 May 1964, *Bernardi 1255* (NY); San Javier valley, along Quebrada La Cueste toward Monterrey, 2500–2650 m, 10 Dec. 1983, *Weitzmann et al. 48* (NY, US). **Trujillo:** old road from Bocono to Trujillo, ca. 51 km W of Trujillo, below summit, 2200–2250 m, 9°21′N, 70°19′W, 20 Oct. 1984, *Knapp & Mallet 6778* (BH, K, MY, VEN).

Solanum habrocaulon S. Knapp, sp. nov. TYPE: Peru. Amazonas: Bongará, 4 km N of Pomacochas on road to Rioja, trail down gorge to W of road, 2150–2200 m, 5°40′S, 77°22′W, 2 June 1986, *Knapp et al. 7507* (holotype, USM; isotype, MO). Figure 4B.

Frutex; caules glabri valde alati; sympodia unifoliata; folia elliptica glabra; inflorescentiae foliis oppositae simplices filiformes; corolla ignota; bacca globosa in pedicello deflexo portata; semina ignota.

Small shrubs with arching flattened branches, ca. 1.5 m tall; young stems and leaves completely glabrous, stems strongly winged from the inflorescence not from the leaf bases, a few papillae present in the axils of the new leaves; bark of older stems dark brown. *Sympodial units* unifoliate. *Leaves* narrowly elliptic to lanceolate, widest just below the middle, with 7–8 pairs of primary veins, glabrous on both surfaces, 6–9 × 1.5–2.7 cm, the apex acuminate, the ultimate tip rounded, margins of the tips minutely ciliate, the base attenuate, decurrent onto the petiole; petiole 2–3 mm long. *Inflorescences* opposite the leaves, almost sessile, simple, 1–2 mm long, 1–2-flowered, glabrous. *Pedicel scars* closely spaced. *Buds* and *flowers* not known. *Fruit* a globose green berry, 0.7–1 cm diam. (immature); *fruiting pedicel* pendant, somewhat woody, 2–2.5 cm long, ca. 0.5 mm diam. at the base, ca. 2 mm diam. at the apex. *Seeds* not known.

Figure 4. —A. Holotype of *Solanum quebradense* S. Knapp (*Gehriger 244*, NY). —B. Isotype of *Solanum habrocaulon* S. Knapp (*Knapp et al. 7507*, MO).

Distribution. Known only from the type locality in montane northern Peru, at ca. 2200 m. Figure 2.

Solanum habrocaulon is a member of the *Solanum dolosum* species group, a small assemblage of three species distributed along the Andes from southern Colombia to Bolivia. The group is characterized by its delicate habit, unifoliate sympodia, long-acuminate leaves with ciliate margins at the tips, and very small flowers. *Solanum habrocaulon* is distinguished from the other members of the *dolosum* species group (*S. dolosum* C. V. Morton ex S. Knapp, *S. gonyrhachis* S. Knapp) by its completely glabrous foliage, strongly winged stems, and minute inflorescences. Members of this group are all apparently rare, but since they are inconspicuous plants of the forest understory it is possible that they are merely undercollected.

This species is named for its winged stems: habro (Greek)—winged, caulon (Greek)—stem.

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Literature Cited

Gentry, A. H. 1982. Neotropical floristic diversity: Phytogeographical connections between Central and South America, Pleistocene climatic fluctuations, or an accident of the Andean orogeny? Ann. Missouri Bot. Gard. 69: 557–593.

Knapp, S. 1986. A revision of *Solanum* section *Geminata* (G. Don) Walpers. Ph.D. Thesis, Cornell University, Ithaca, New York.

———. 1989. A revision of the *Solanum nitidum* group (section *Holophylla* pro parte): Solanaceae. Bull. Brit. Mus. (Nat. Hist.), Bot. 19: 63–102.